between the downward claw pole **43**_a_ and the upward claw pole **43**_b_ which are adjacent to each other along the circumferential direction and the magnetic flux passing through one of the claw poles **43**_a_ and **43**_b_ is induced to the other side, it is possible to suppress a leakage of the magnetic flux between the downward claw pole **43**_a_ and the upward claw pole **43**_b_. Accordingly, even when necessary torque is relatively great, it is possible to prevent magnetic saturation and to provide the necessary torque.

[0250] In more detail, as shown in FIG. **28**, a magnetic circuit **1** which passes through the rotor **10** in the order of the downward claw pole **43**_a_, the magnetic body **40**, and the upward claw pole **43**_b_ and then toward the rotor **10** again, and a magnetic circuit **2** which passes through the rotor **10** in reverse order of the upward claw pole **43**_b_, the magnetic body **40**, and the downward claw pole **43**_a_ and then toward the rotor **10** again are formed according to a direction of currents flowing through the coil **4**_c_.

[0251] According to the claw pole motor **100** in accordance with the embodiment, since it is possible to suppress a leakage of magnetic flux in the magnetic circuit **1** and the magnetic circuit **2** in comparison to a case in which the claw pole motor **100** is configured without using the magnetic body **40** (for example, a configuration shown in FIG. **26**), induced voltage may be increased by about 1.55 times and available torque may be increased by about 1.55 times.

[0252] Meanwhile, the disclosure is not limited to the embodiment.

[0253] For example, although the magnetic body **40** in accordance with the embodiment is formed by winding an electric steel sheet in a cylindrical shape as shown in FIG. **30**, the plurality of divided magnetic bodies **41** which cover the outside of the coil **4**_c_ may be arranged in a polygonal shape.

[0254] Also, even though the divided magnetic bodies **41** in accordance with the embodiment are formed by dividing an electrical steel sheet wound in a cylindrical shape by forming slits SL therein in an axial direction thereof as shown in FIG. **30**, the divided magnetic bodies **41** may have, for example, a rectangular parallelepiped shape formed by arranging the electrical steel sheets in a rectangular shape in a diametric direction. Meanwhile, the magnetic bodies **41** are not limited to the arranging of the electrical steel sheets in the rectangular shape, and may be block bodies. Also, the shape is not limited to the rectangular parallelepiped shape and may be any shape satisfying a magnetic circuit between adjacent claw poles along a circumferential direction.

[0255] Also, in the embodiment, the claw poles **43**_a_ and **43**_b_ are arranged without covering the outer circumference of the coil **4**_c_ and are formed in an L shape when viewed in the circumferential direction, but the claw poles **43**_a_ and **43**_b_, like the second embodiment, may be formed in an n shape when viewed in the circumferential direction.

[0256] In this case, as shown in FIG. **31**, the divided magnetic bodies **41** may be disposed on the outside of the coil **4**_c_ between the downward claw pole **43**_a_ and the upward claw pole **43**_b_ adjacent to each other along the circumferential direction. In addition, the disclosure is not limited to the embodiment and may be modified into various forms without departing from the concept thereof.

[0257] Next, a claw pole motor in accordance with the fourth embodiment of the disclosure will be described.

[0258] Meanwhile, members corresponding to the members described in the third embodiment will be referred to by the same reference numerals.

[0259] The claw pole motor in accordance with the embodiment is a single-phase claw pole motor and, as shown in FIGS. **32** and **33**, like the third embodiment, in a detailed configuration, may include a downward claw pole **43**_a_ and an upward claw pole **43**_b_ formed in an L shape when viewed in a circumferential direction and a magnetic body **40** which forms a magnetic circuit between the downward claw pole **43**_a_ and the upward claw pole **43**_b_.

[0260] The downward claw pole **43**_a_ and the upward claw pole **43**_b_ are positioned between a coil **4**_c_ and a rotor **10** and include vertical magnetic poles **21**T (corresponding to the first magnetic pole element **211** in the third embodiment) which extend in an axial direction and horizontal magnetic pole elements **21**L (corresponding to the third magnetic pole element **213** in the third embodiment) which extend from end portions of the vertical magnetic pole elements **21**T in a diametric direction and are positioned at the bottom or top of the coil **4**_c_.

[0261] The magnetic body **40** forms a magnetic circuit which induces magnetic flux which passes through one of the downward claw pole **43**_a_ and the upward claw pole **43**_b_ to the other side, and is formed in a cylindrical shape. At least a part of the magnetic body **40** is installed to overlap the horizontal magnetic pole elements **21**L when viewed in the axial direction. Here, the horizontal magnetic pole elements **21**L extend further to the outside than the magnetic body **40** in a diametric direction.

[0262] Also, in the embodiment, gaps Sx are formed between the magnetic body **40** and the horizontal magnetic pole elements **21**L.

[0263] In more detail, guide portions G are formed on opposite surfaces of an upper supporting member **24** supporting the downward claw poles **43**_a_ and a lower supporting member **23** supporting the upward claw poles **43**_b_, and the magnetic body **40** is installed on the guide portions G to form the gaps Sx with a size according to a height of bottom plates of the guide portions G.

[0264] Here, as shown in FIG. **33**, the gaps Sx are formed between the horizontal magnetic pole element **21**L of the downward claw pole **43**_a_ and the magnetic body **40** and between the horizontal magnetic pole element **21**L of the upward claw pole **43**_b_ and the magnetic body **40**. Here, the gaps Sx have approximately the same sizes. In other words, all distances of the gaps between the magnetic body **40** and the horizontal magnetic pole elements **21**L are configured to have the same lengths.

[0265] Here, a result of analyzing an electromagnetic field of a configuration in which the horizontal magnetic pole elements **21**L and the magnetic body **40** are in contact with each other is shown in FIG. **34**. As can be seen from the result, when the horizontal magnetic pole elements **21**L and the magnetic body **40** are in contact with each other, cogging torque acts in a negative direction when the motor is maneuvered and conducting torque also acts in the negative direction accompanying the same. As a result thereof, since synthetic torque acts in the negative direction, in the above description, a problem in which the rotor **10** starts reversely rotating after being maneuvered and stalls until the synthetic torque is zero to be stopped when a load to a motor is great occurs.